Growth Rate in Area, Production and Productivity of Watermelon in Jaipur district and Rajasthan state

Or

Growth Rate of Watermelon in terms of Area, Production and Productivity in Jaipur,Rajasthan,India

Or

Watermelon Growth Rate in terms of Area, Production and Productivity in Jaipur,Rajasthan,India

(AUTHORS ?)

Abstract

An attempt has been made in this paper to estimate the growth trends in area, production and productivity of watermelon in Jaipur district and Rajasthan state. For the present study, secondary data on area, production and productivity of watermelon in Jaipur district and Rajasthan state as a whole for the period 2009-10 to 2018-19 were collected from Department of Horticulture, Pant Krishi Bhawan ~~*etc*~~ *(be specific about the collection place).* The data were analyzed through growth rate, co-efficient of determination and root mean square techniques. ~~to study the growth in area, production and productivity of watermelon in Jaipur district and Rajasthan state~~ (repetitions). For analysis of growth rates ~~revealed that~~ the exponential growth model was found the best ~~fitted model in this analysis~~. Growth rates in area, production and productivity of watermelon were estimated to be significantly negative in Jaipur district and in Rajasthan state for the study period 2009-10 to 2018-19.

Introduction:

Watermelon (*Citrullus lanatus*) of Cucurbitaceae family *(Reference)* is the major commercial crop in India. Watermelon is a native of tropical Africa ~~is one of the most important fruit cultivated in the tropics~~. In South Carolina, watermelon is called "Smile Fruit", but it is actually not a fruit. It is a vegetable like cucumber, squash, pumpkin and cantaloupe~~, the watermelon is really a member of the gourd family (i.e., Cucurbitaceae)~~. ~~Watermelon is a native of tropical Africa.~~ Watermelon is grown worldwide in tropical and subtropical areas for its large edible fruit. A large fruit is a kind of modified berry called a *pepo* with a thick rind (exocarp) and fleshy center (mesocarp and endocarp) *(Reference)*. The fruit is juicy, pink, red or yellow flesh with numerous small black seeds. The watermelon is an annual crop that has a prostrate or climbing habit. The watermelon fruit has 78 per cent edible portion. The edible portion in watermelon fruit contains moisture (95.8 per cent), protein (0.2 per cent), minerals (0.3 per cent), carbohydrates (3.3 per cent) and energy (16 k. cal). *(Put Reference as you have given values)*

Global area under watermelon cultivation was 32.41 million hectare with the production of 1039.31 million tonnes in the year 2018. Major watermelon producing countries are China, Iran, Turkey, Brazil, United States, India etc. in the world. China ranked first in watermelon production with 628.03 million tonnes from an area of 14.99 million hectare in the year 2018 (Source: India Agri Stat.com). In India, major watermelon growing states ~~in India~~ are Uttar Pradesh, Himachal Pradesh, Rajasthan, Orissa, Gujarat, Punjab, Haryana, Assam, West Bengal, Andhra Pradesh, Karnataka, Telangana and Maharashtra. ~~In India,~~ Area under watermelon cultivation was estimated at 100 thousand hectares with production of 2495 thousand MT in the year 2018-19 (Source: Indian Horticultural Database, National Horticulture Board, 2018-19).

In Rajasthan, area **under watermelon cultivation** was 2113 hectares with production of 15120 MT in the year 2018-19. It is sown during late February to mid-March ~~in Rajasthan state~~. ~~In this state,~~ were large area ~~was put **under** **watermelon crop** in only~~ are under Jaipur and Sikar districts ~~and in remaining districts, area **under watermelon crop**~~. Jaipur district occupied first position in area ~~**under watermelon cultivation**~~ with1408 hectares and ~~with~~ production of 3926 MT during the year 2018-19 (Source: Rajasthan agriculture statistics at a glance, Horticulture department, Jaipur, 2018-19). *club the sentence whenever required and avoid repeatation* . In the present scenerio at Rajasthan, few cultivators practice in particular

regions as well as on ~~little~~ limited area were ~~put~~ under watermelon crop ~~at present~~. This is mainly due to the lack of the information on economic aspects like growth in production, costs of and returns from cultivation of watermelon, marketing costs, margins and price spread in marketing of watermelon. Further, cultivators do not know about the potential of watermelon for generating high income. Thus, vital information on the economic aspects of watermelon cultivation needs to be generated.

Objective:

1. Growth rate in area, production and productivity of watermelon in Jaipur district and Rajasthan state.

Methodology:

To study the growth rates in area, production and productivity of watermelon, the following growth models was tested:

Linear function:

$$\mathbf{Y = a_0 + a_1 x_1 + \ldots + u_t}$$

Where,

Y = Area / production / productivity of watermelon crop

a_0 = Constant

a_1 = Coefficient factor

x_1 = Production factor

u = Error term

t_1 = time factor *(match it with the equation)*

Semi log function:

$$\mathbf{Log\ Y = \alpha + \beta^t}$$

Where,

Y = Area / production / productivity of watermelon crop

α= Constant

β= Regression coefficient

t= time in year

Exponential function:

$$Y = \alpha \beta^{t}$$

Taking log both side for linear transformation of functional model

$$\text{Log } Y = \log \alpha + t \log \beta$$

$$Y^{*} = \alpha^{*} + \beta^{*} \quad \textit{(t is missing)}$$

Where,

$Y^{*} = \log Y$

$\alpha^{*} = \log \alpha$

$\beta^{*} = \log \beta$

Where,

Y= Area / production / productivity of watermelon crop

α= Constant

β= Regression coefficient

t= time in year

Compound growth rate (%) = (Antilog β-1)100.

After fitting the first linear trend function by least-square method, we get the estimate of β_1. Then, annual linear growth rate was computed as follows

$$r = \frac{\beta_1}{\bar{y}} \times 100$$

(is y should be capital or small check it)

Where, $\bar{Y}$ is arithmetic mean of Y_t

To obtain annul semi- log growth rate, it was computed as follows

$$r = \beta_1 \times 100$$

The annual Exponential growth rate was then computed as

$$r = (\text{Antilog } \beta_1 - 1)100$$

Results and Discussion:

Growth rates in area, production and productivity of watermelon in Jaipur district

The growth rates in area, production and productivity of watermelon during the period, 2009-10 to 2018-19 in Jaipur district are shown in table no.1 The simple growth trends in area, production and productivity of watermelon in Jaipur district from 2009-10 to 2018-19 are given in Fig.No.1, 2 and 3, respectively.

Table No. 1 shows that growth rate in area under the watermelon cultivation in Jaipur district decreased at an exponential growth rate of 2.34 per cent per annum which was significant at 1 per cent level of significance. Production of the watermelon was significantly decreased at exponential growth rate of 1.12 per cent per annum due to decreased in area under watermelon cultivation. The negative growth rate in productivity of watermelon was registered 2.11 per cent per annum at 5 per cent level of significance because of the decrease in area and production of watermelon in the study area. The coefficient of determination (R^2) was estimated to be 0.55, 0.57 and 0.49 indicated that 55 per cent, 57 per cent and 49 per cent of variation in area, production and productivity, respectively, was due to time variable. Similar study finding were reported by Acharya *et.al.* (2012), Dakhare and Bhattchary (2013).

Table No. 1 Growth rates in area, production and productivity of watermelon during the period, 2009-10 to 2018-19 in Jaipur district.

s.no	Growth model	Response variable	Coefficients		Growth-rate (%per annum)	R^2	RMSE	F value
			β_0	β_1				
1.	Linear	Area	2304.06**	-79.28**	-4.24	0.52	242.72**	8.80**
	Semi-log		2233.48*	-241.97*	-2.41	0.28	297.23*	3.20*
	Exponential		2358.62**	-0.0451**	-2.34	0.55	0.1303**	10.02**
2.	Linear	Production	16793.06**	-1002.88**	-8.89	0.57	2793.27**	10.62**
	Semi-log		16082.86*	-3181.63*	-3.18	0.33	3472.64*	4.05*
	Exponential		20185.13**	-0.122**	-1.12	0.57	0.339**	10.62**
3.	Linear	Productivity	7791.53**	-351.62**	-6.0	0.48	1173.06*	7.41*
	Semi-log		7586.77**	-1144.81**	-1.14	0.29	1363.40**	3.41**
	Exponential		8557.68*	-0.077*	-2.11	0.49	0.2489*	7.85*

Figures in parentheses are level of significant

** Indicating significant at 1% level of significant.

* Indicating significant at 5% level of significant.

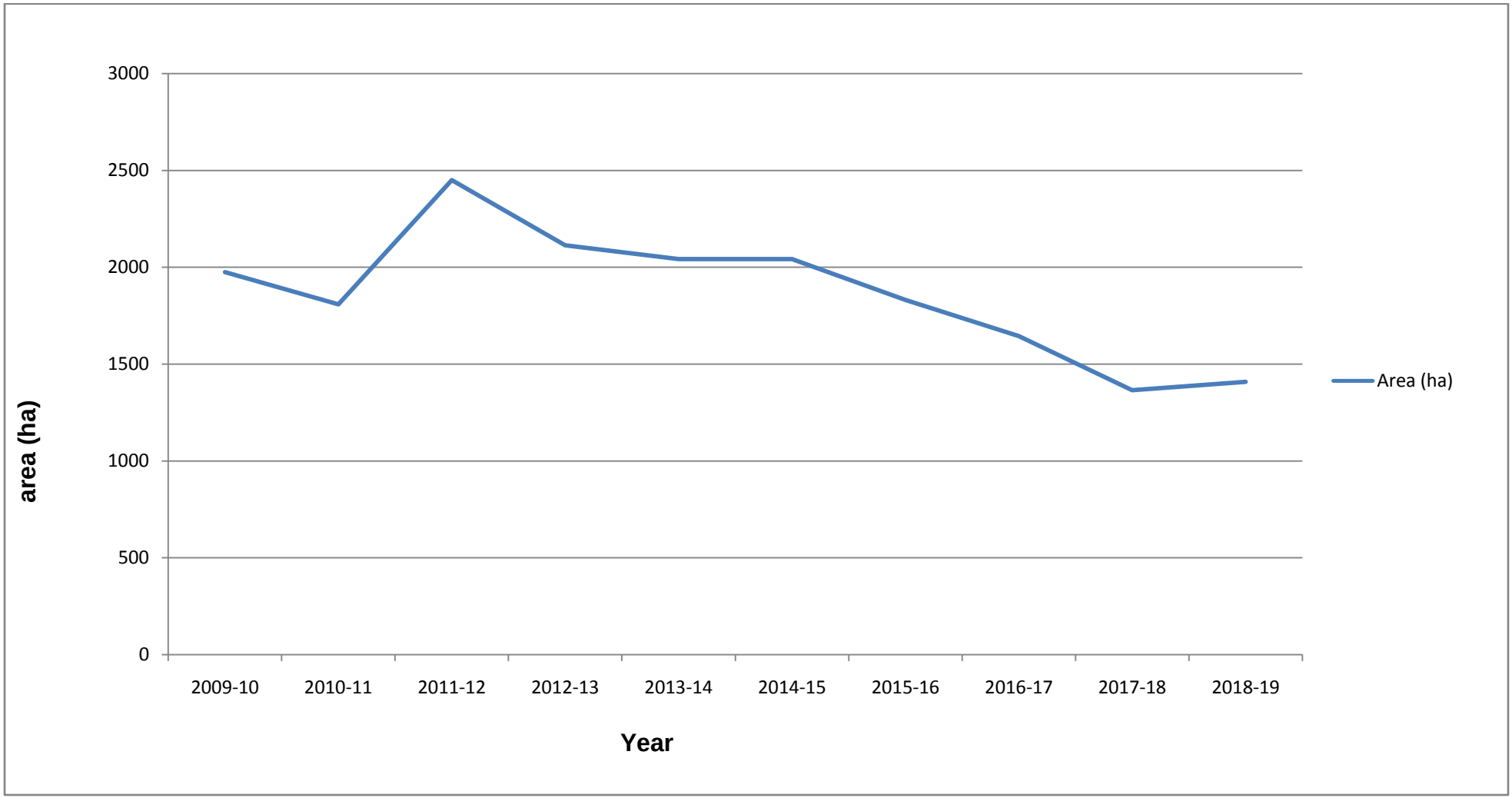

Fig.No.1 ~~Simple~~ growth trend in area of watermelon in Jaipur district from 2009 – 10 to 2018 - 19

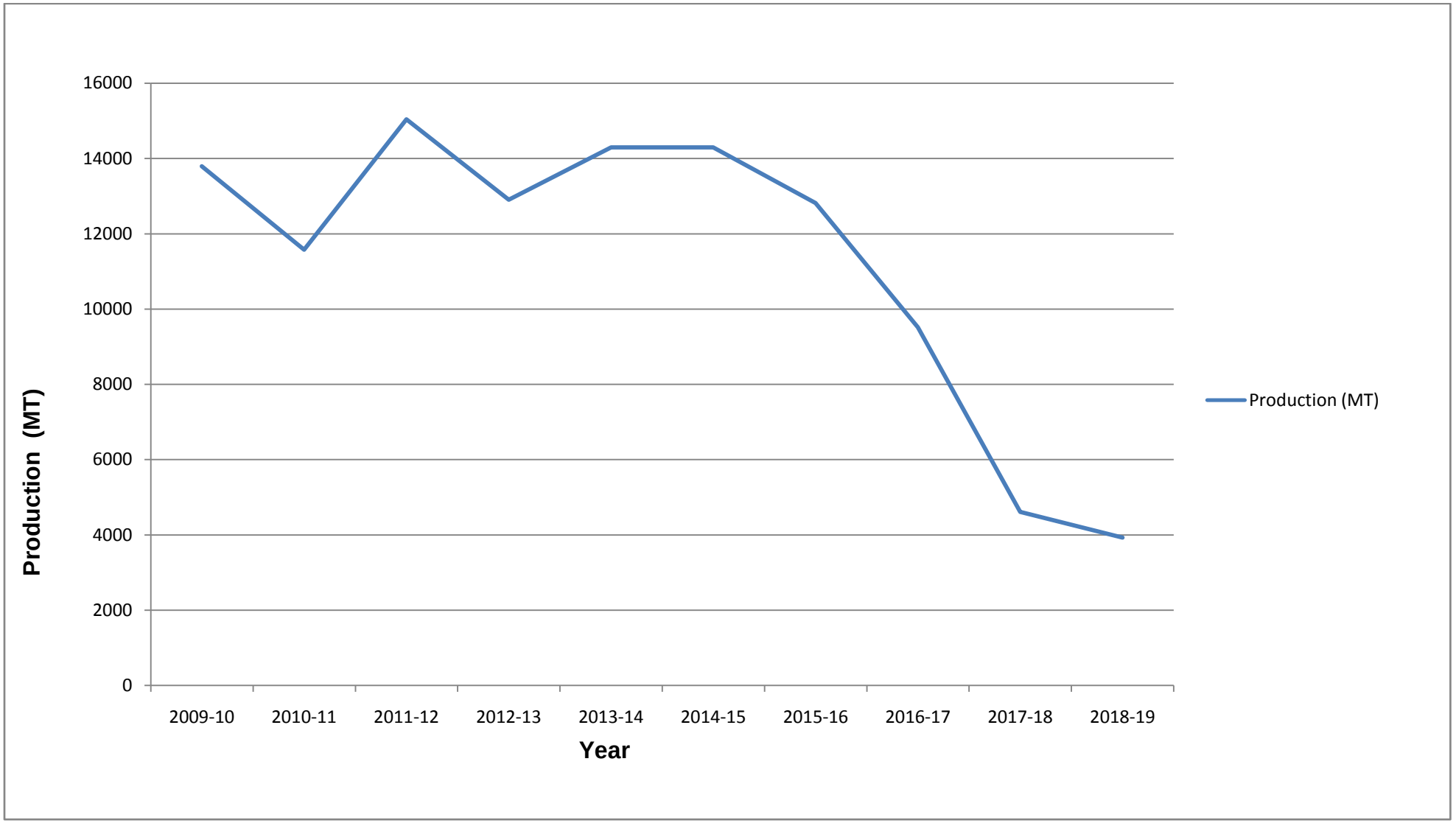

Fig.No.2 ~~Simple~~ growth trend in production of watermelon in Jaipur district from 2009 – 10 to 2018 - 19

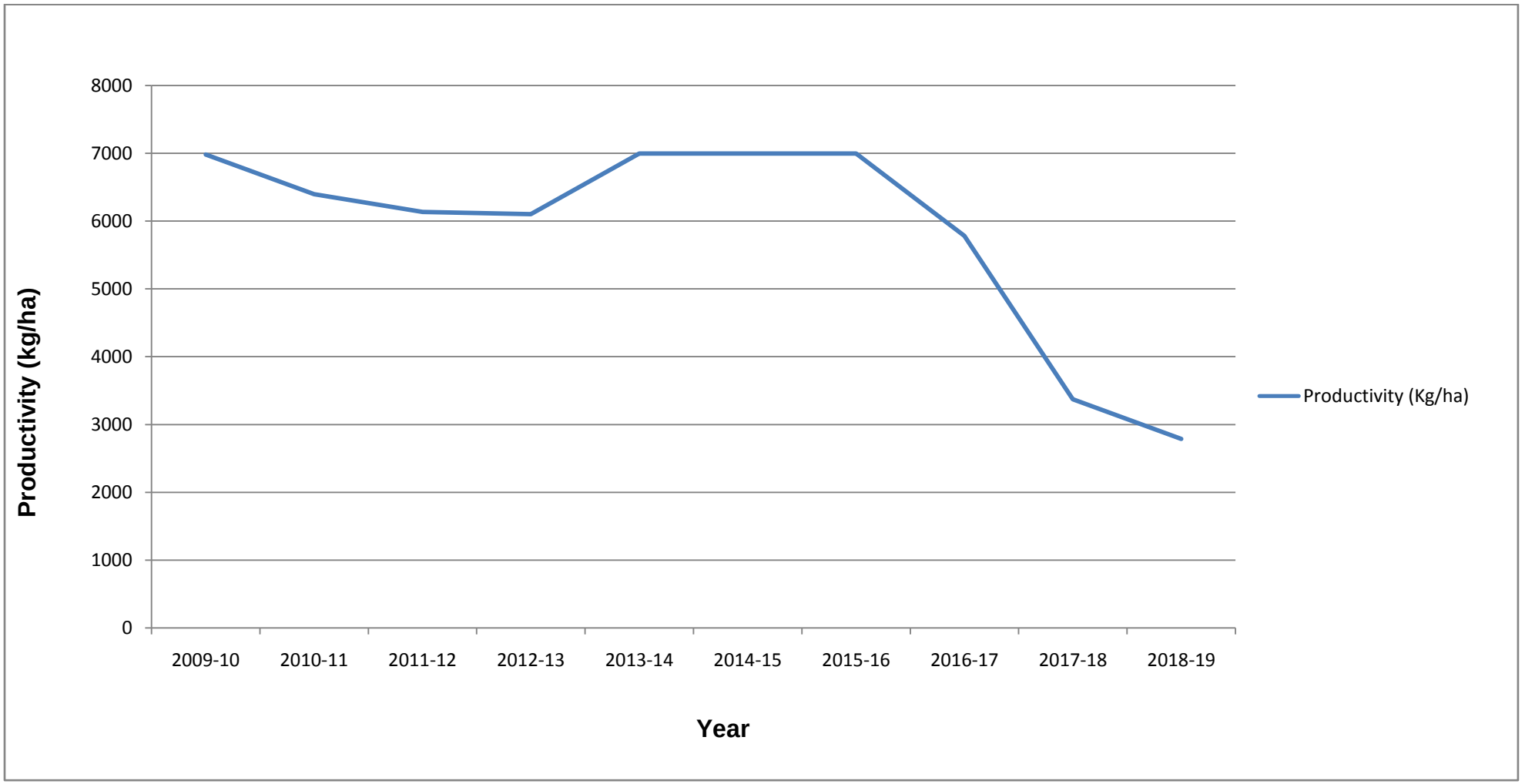

Fig.No. 3 ~~Simple~~ growth trend in productivity of watermelon in Jaipur district from 2009 – 10 to 2018 - 19

Growth rates in area, production and productivity of watermelon in Rajasthan state

Table No.2 depicts that growth rates in area, production and productivity of watermelon in Rajasthan state as a whole for the period 2009-10 to 2018-19. The simple growth trends in area, production and productivity of watermelon in Rajasthan state during the study periods are given in Fig.No.4, 5 and 6, respectively.

This table indicates that growth rate in area under watermelon cultivation was decrease at 1.03 per cent per annum which was significant at 5 per cent level of significance. The growth rates in production and productivity of watermelon were found negative i.e., 1.43 and 10.13 per cent per annum, respectively. It was also found significant at 5 per cent level of significance. Watermelon cultivation recorded a negative growth rates in area, production and productivity during the study period in the state as whole. The coefficient of determination (R^2) for area, production and productivity of watermelon was 0.59, 0.53 and 0.52, respectively. It was also explained in term of 59 per cent, 53 per cent and 52 per cent of variation in area, production and productivity, respectively. Similar study was supported by Singh and Rani (2013).

Table No. 2 Growth rates in area, production and productivity of watermelon during 2009-10 to 2018-19 in Rajasthan state.

s.no	Growth model	Response variable	Coefficients		Growth-rate (% per annum)	R^2	RMSE	F value
			β_0	β_1				
1.	Linear	Area 3MA	3257.16*	-97.891*	-3.60	0.59	215.98*	8.62*
	Semi-log		3149.78+	-251.30+	-2.51	0.32	299.98+	2.83+
	Exponential		3308.10*	-0.037*	-1.03	0.59	0.0836*	8.68*
2.	Linear	Production 3MA	16572.79*	736.56*	3.86	0.51	1907.74*	6.26*
	Semi-log		16435.83	2603.77	3.41	0.52	1877.17	6.66
	Exponential		16720.8*0	0.037*	-1.43	0.53	0.0894*	6.77*
3.	Linear	Productivity	5004.06*	389.84*	5.45	0.49	1253.75*	7.97*
	Semi-log		5007.56*	1417.22*	3.51	0.38	1387.45*	5.04*
	Exponential		5224.61**	0.053**	-10.13	0.52	0.1612**	8.76**

Figures in parentheses are level of significant

** Indicating significant at 1% level of significant.

* Indicating significant at 5% level of significant.

+ Indicating significant at 10% level of significant.

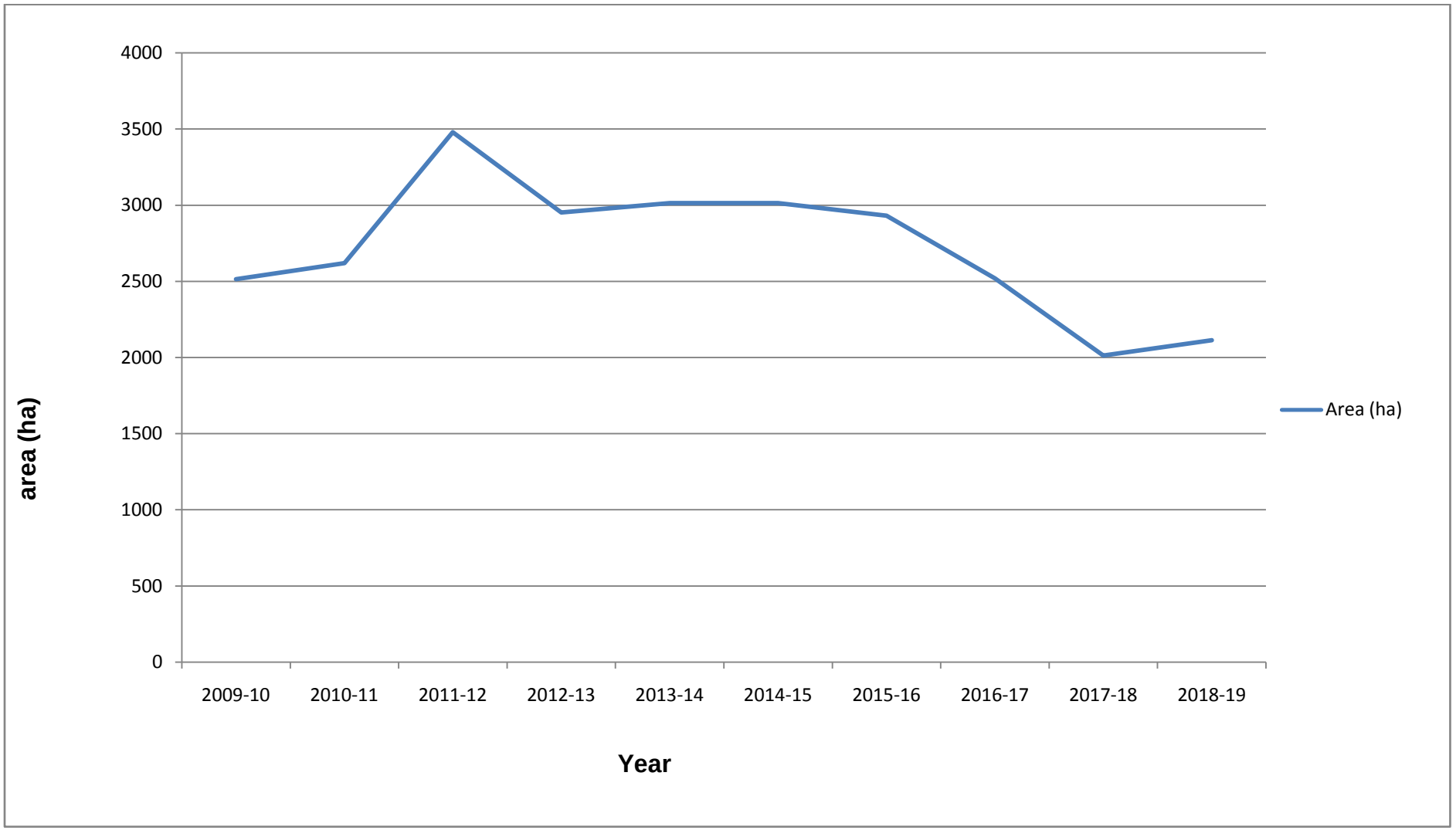

Fig.No. 4 ~~Simple~~ growth trend in area of watermelon in Rajasthan state from 2009–10 to 2018-19

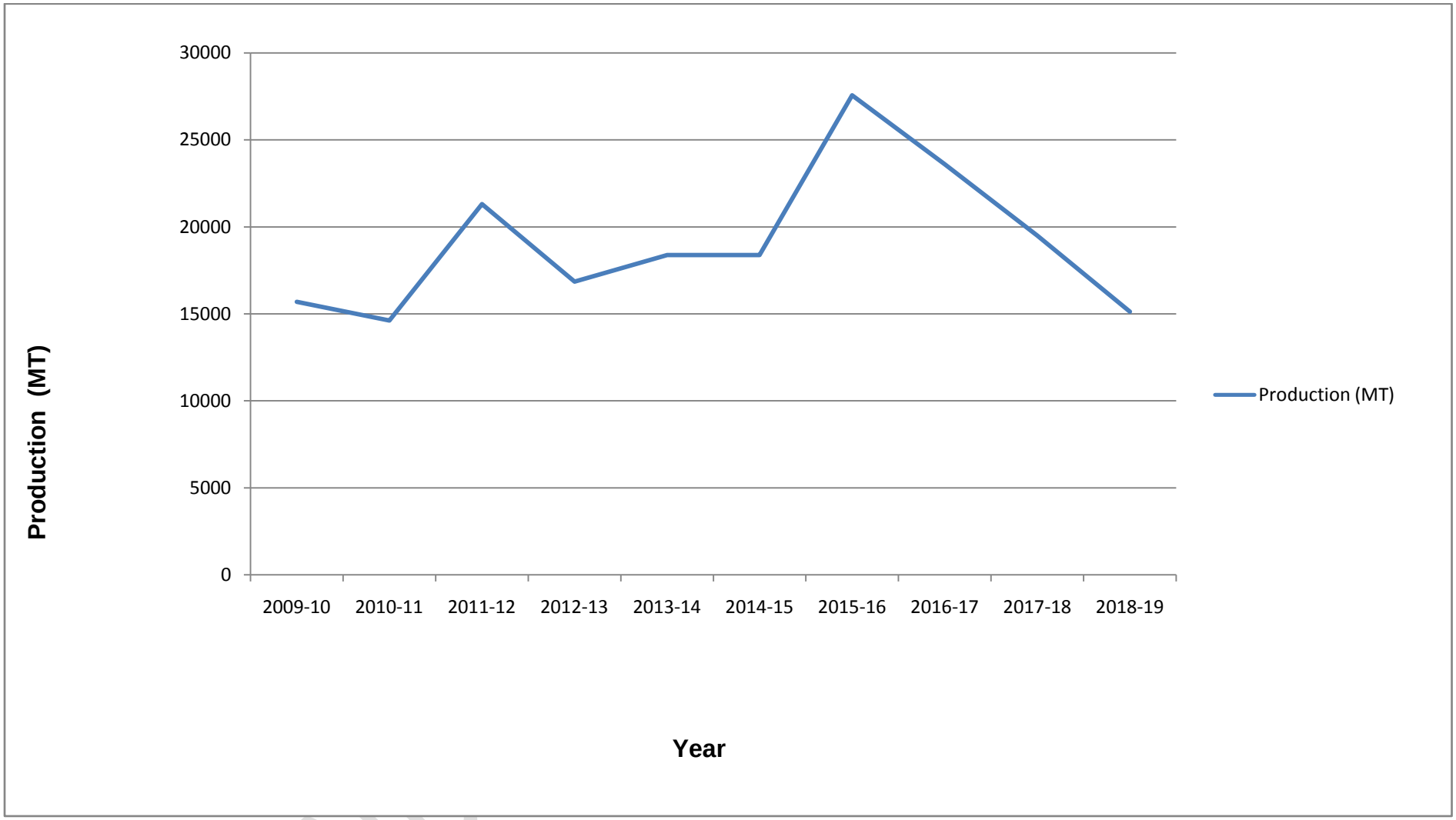

Fig.No.5 ~~Simple~~ growth trend in production of watermelon in Rajasthan state from 2009 – 10 to 2018 - 19

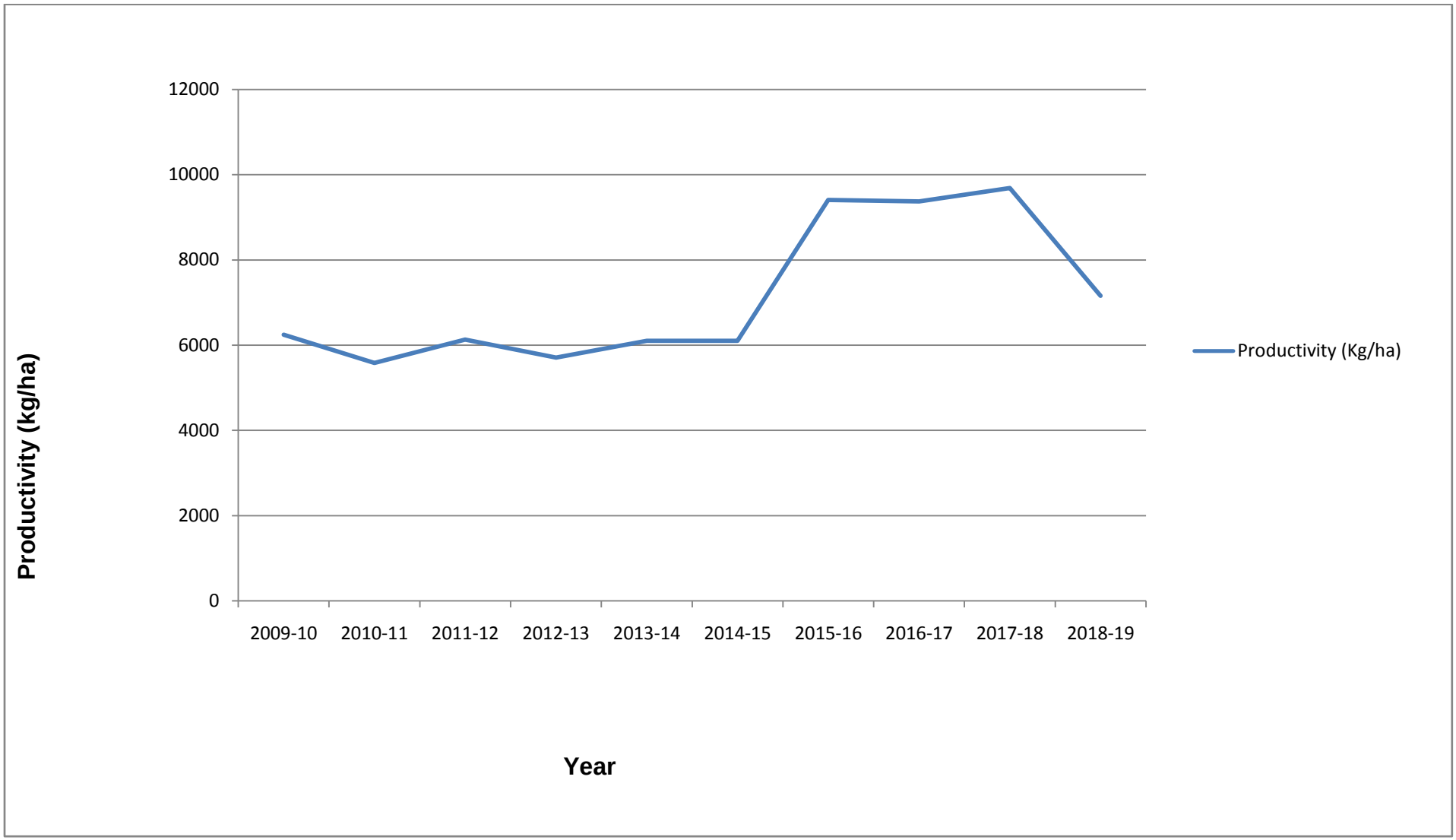

Fig.No.6 ~~Simple~~ growth trend in productivity of watermelon in Rajasthan state from 2009 – 10 to 2018 – 19

Conclusion:

The growth rates in area, production and productivity of watermelon were calculated significantly negative in the Jaipur district and in the Rajasthan state. *(Elaborate the conclusion more. So, from his study what do you think about watermelon cultivation in Jaipur and Rajasthan. What suggestions you want to give to the cultivators.)*

References:

Website for statistical report

Eg. (Source: Rajasthan agriculture statistics at a glance, Horticulture department, Jaipur, 2018-19

- https://...

Put more references at least 10-15 nos.

Acharya, Poudel Saraswati, H. Basavaraja, L.B. Kunnal, S.B. Mahajanasetti and A.R.S. Bhat (2012). Growth in area, production and productivity of major crops in Karnataka. *Journal Agricultural Science*, **25**(4) : 431-436.

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